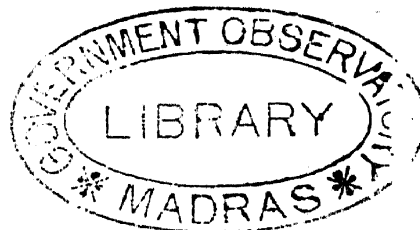




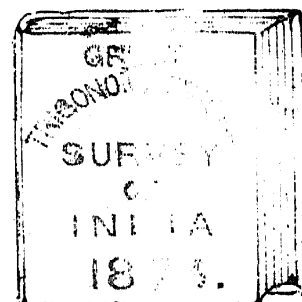
A SKETCH  
OF  
THE MOUNTAINS AND RIVER BASINS

OF  
INDIA;



IN TWO MAPS, WITH EXPLANATORY MEMOIRS.

BY TRELAWNY SAUNDERS,  
GEOGRAPHER, INDIA OFFICE.



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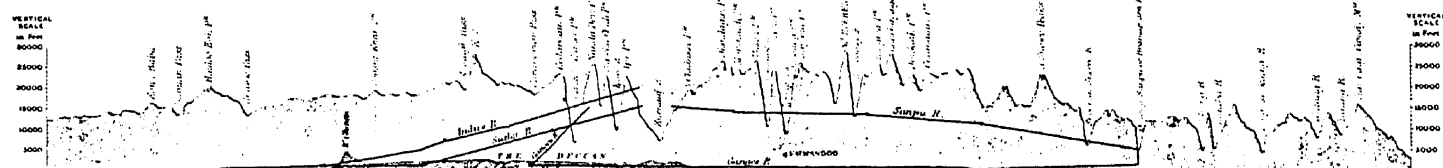
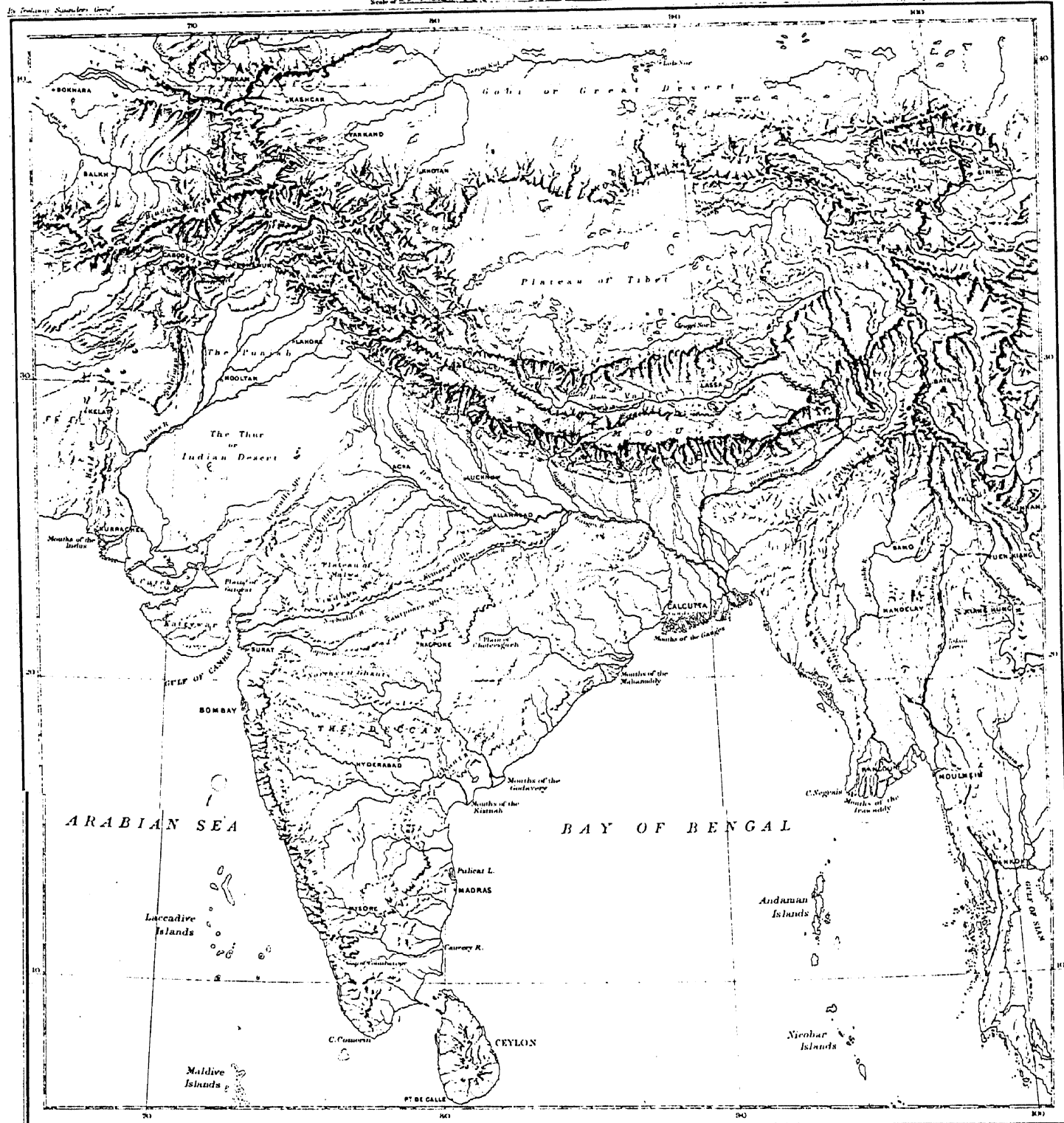




Section of the Himalaya Mts and Tibet between Longitude 79° & 80°

# A SKETCH OF THE MOUNTAINS OF INDIA AND ITS BORDERERS

Section of the Himalaya Mts and Tibet about Longitude 83°



A comparative Series of vertical sections:

1. Through the peaks and valleys of the Himalaya range.
2. Along the base of the Himalaya range, showing the extent of the plateau and the range of the mountains.
3. Along the base of the Himalaya range, showing the extent of the plateau and the range of the mountains.
4. Along the base of the Himalaya range, showing the extent of the plateau and the range of the mountains.
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10. Along the base of the Himalaya range, showing the extent of the plateau and the range of the mountains.

# ON THE MOUNTAINS AND RIVER BASINS OF INDIA.

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THE preparation of the accompanying maps was undertaken by desire of Mr. Grant Duff. They are designed to give a graphic view of the mountains and rivers of India under two aspects. In the one, the varieties of elevation above the sea form the chief object, and considering that in Mount Everest India possesses the highest point yet measured on the earth's surface, it may be assumed that this object is well deserving of attention.

In the other point of view the rivers and their drainage areas, in connection with the mountains, are made prominent. In the one case, the eye is directed from the sea to the summits of the land, in the other from the sources of rivers to their outfalls, sometimes into the ocean, or otherwise into inland lakes.

In both maps the Himalaya mountains will be found in a new form, and although the scale is very small, more distinctness has been given to the general features of this vast mass than hitherto. In particular, the great peaks have been represented as a culminating outer range, separated by a chain of elevated valleys from an inner range which forms the waterparting between the basins of the Ganges and Sanpu-Bramaputra. The vast Tibetan highland lying north of the Himalaya, and of which indeed that range forms but the southern wall and escarpment, is also clearly defined, so far as existing materials permit.

Within the double range of the Himalaya may be distinguished (1.) The great trough formed by the Sanpu, the Sutlej, and Indus. (2.) The high inhabited plain of Tibet, 15,000 to 17,000 feet above the sea, draining chiefly into lakes. The Changchenmo route crosses its western extremity in the 80th meridian, and it extends to the eastward of Lassa and the 91st meridian. (3.) The lofty plain is succeeded on the east by a part of the highland, cut up by vast gorges and narrow ranges, watered by great and rapid rivers, of which the Sanpu is the most westerly, and the Yalung, an affluent of the Yang-tse, is the most easterly. In these maps the basin of the Sanpu is made conterminous with that of the Yang-tse, but some would carry the three distinct basins of the Irawaddy, the Salween, and the Mekong or Cambodia rivers up northward into the narrow space between the Sanpu and the Yang-tse. This is one of the problems that can only be settled by scientific exploration. (4.) The northern limits of the Tibetan highland, generally identified with the Kuenlun mountains (which are likewise known by other names), is also defined. Ascertained by observation to rise up to summits exceeding 20,000 feet at its western extremity, about Khotan; in the same region the northern base of the Kuenlun range has been observed in the plains of Gobi to be only 4,000 feet above the sea. But all detailed knowledge of the interior of this extraordinary country is wanting, and it must continue to be a sealed book to Europeans until friendly pressure is put upon the Government of Peking to allow European intercourse between India and the Chinese dominions.

The following is a brief comment upon the two maps. Many names will be mentioned the situation of which is sufficiently indicated, but they could not be engraved on maps of so small a scale without injury to the natural features.

The vertical sections form a key to the principal elevations. A perpendicular line from any point on the bottom section will intersect its position on the map. This section is drawn from east to west, and distinctly defines the relative heights of the summits and bases of the Himalaya. It also brings that vast range into comparison with the plateau of Southern India.

The sections at the top of the maps exhibit the altitudes of the Himalaya and Tibet from the northern to the southern bases of the mass, on two meridians. The boundaries and names of the principal political divisions have been inserted in a pale pink colour on the map of the mountains, so as not to interfere with the natural features.

## THE MOUNTAINS OF INDIA.

The mountains of India are separated into two distinct parts, northern and southern, by a continuous belt of lowland extending from the Arabian Sea to the Bay of Bengal. The lowland is washed by the Indus and its branches westward, and by the streams of the Ganges basin eastward. The western slope includes the Punjab, Sind, and the greater part of Rajpootana. The eastern or Ganges lowland includes the greater part of the North-West Provinces, Oude, and the Lower Provinces of Bengal.

On the waterparting of the two rivers, the lowland rises to an elevation of 900 feet. Where the streams of the Punjab or Five Rivers unite with the Indus, the altitude is only 369 feet at a distance of 450 miles from the sea. The confluence of the Ganges and Jumna at Allahabad, 846 miles from the sea, is about the same height, or 340 feet.

The northern edge of the lowland, at the foot of the hills which skirt the Ganges plain, is generally a swamp, full of springs and marshes, called the Terai. The first range of hills is to a remarkable extent separated from the Himalaya mountains by an intervening valley, and forms a distinct series from 2,000 to 3,000 feet high. Between the Indus and Jhelum rivers, these low hills are called the Salt Range; and between the Sutlej and the Ganges, they are well known as the Sewalik hills, a name which may be conveniently applied to the whole system. The valley separating the hills from the base of the mountains is sometimes called a Doon, as Dehra Doon. Forests commonly clothe the hills and the base of the mountains, and form a distinct belt called the Bhavar.

### I.—THE HIMALAYA MOUNTAINS AND TIBETAN PLATEAU.

The northern part of the Indian mountains consists of the lofty Himalaya, with offsets extending from their eastern and western extremities down to the sea, the whole enclosing India in a vast amphitheatre. The Himalaya mountains include the highest peak in the world (Mount Everest, 29,002 feet). They form the southern buttress of the immense plateau of Tibet, where boundless plains are spread out at a height of 16,000 feet above the sea, exceeding the altitude of

the highest summits of the Alps, but still habitable, rich in minerals, and yielding pasturage to innumerable sheep.

The Himalaya rise rapidly from the Doons to a height of about 5,000 feet ; and the ascent is continued up to summits, forming, within a horizontal distance of 60 miles from the plain, a range of snowy peaks, varying in elevation from 20,000 to 29,000 feet. Some of the peaks approach much closer to the plain, as Chur peak, which attains to an altitude of 12,000 feet within 20 miles of the plain.

The peaks are often separated by valleys which are not more than 6,000 feet above the sea ; but within the range of peaks, the valleys are sometimes above 10,000 feet high. The valleys commonly run parallel with the main range, till they break through the outer ridges by intersecting gorges.

On the north, the Himalaya descend into the valley of the Sanpu or Bramaputra flowing eastward, and into the valleys of the Sutlej and the Indus flowing westward. Snowy peaks skirt the edge of this northern slope, at an elevation not inferior to that which is generally attained by the peaks of the southern crest. But while the southern peaks descend to a base for the most part less than a thousand feet above the sea, the base of the northern range of peaks is elevated between 10,000 and 15,000 feet.

The summit of the Himalaya consists then, for the most part, of a double range of peaks, enclosing a series of high valleys running parallel to the axis of the mass. Some of these valleys are about 10,000 feet above the sea, as that of the Upper Gundak. The valley of Cashmere, also between the two summit ranges, is only 5,000 feet high. It is not generally known that the Chinese authority extends quite up to the valleys between the southern range of peaks, one of their frontier posts being established at an elevation of only 6,000 feet above the Gangetic plain north of Katmandu, while Chinese armies have seriously threatened Katmandu itself, which is only 4,050 feet high. The successful advance of Sir David Ochterlony towards the same place, in 1816, is also well known. Thus the military passage of the Himalaya has been proved to be practicable, indeed there is no reason to expect there, greater obstructions than those which have been surmounted in the Alps and the Pyrenees.

The upper valleys of the Sanpu, the Sutlej, and the Indus, appear to form a huge elevated trough separating the Himalaya from the northern part of the table-land of Tibet, and from the snowy range into which that table-land contracts at its western end. This range is crossed by traders in its narrowest part, through the Mustagh (Snowy Mount) pass, and also through the Karakoram (Black Mount) pass, at heights of 18,000 feet, and where it becomes wider it is traversed by the Changchenmo pass. The routes through these passes connect the Indus with the rebel cities in the Chinese province of Ili, as Khoten, Yarkand, Kashgar, &c. The snow-clad range itself is remarkable for extraordinary glaciers, one of which is sixty miles in length, and one of the peaks (K2) is known to be 28,278 feet high. The Indus forms the southern base of this range, and the northern base of this part of the Himalaya ; the height of the river being about 16,000 feet, at its source on the northern slope of the sacred Mount Kailas, 10,723 feet at Leh in Ladak,—and 4,500 feet at Acho near the great bend, where the river intersects the western end of the Himalaya, through a

gorge of probably 14,000 feet in depth. This gorge has only been explored by Europeans at its extremities, so that the course of the Indus has not been completely traced yet.

The Sutlej also rises at the northern base of the Himalaya, in the great lakes named Manasarowar and Rakas Tal, sacred to Hindoos and the resort of Tibetan shepherds, and 15,200 feet high. In its passage along the northern base of the Himalaya, the Sutlej traverses the extraordinary plain of Gugé, where the river exposes a vast accumulation of alluvium, forming the surface of the plain, into which the Sutlej has cut its way down into a channel 4,000 feet deep, between precipices of alluvial soil.

After traversing the plain of Gugé the Sutlej intersects the Himalaya through a gorge, where the mountains rise to 20,000 feet on either side, while the river rushes down from 10,000 feet at Shipki, a Chinese frontier post, 3,000 feet at Rampoor, and 1,000 feet at Belaspoor, at the southern base of the mountains.

Eastward of the Indus and Sutlej the great trough which forms the northern base of the Himalaya is watered by the Sanpu. It is almost certain that this river joins the Bramaputra in Assam under the name of the Dihong, but like the Indus, its passage across the mountains has not been explored. The distance which remains unexplored on the Sanpu is much greater than that on the Indus.

The Sanpu rises close to the sources of the Indus and Sutlej at a height of 16,000 feet. It is 14,200 feet at Tadum, 11,800 feet at Shigatzé, and 11,300 feet near Lassa. Between Lassa and the plain of Assam is the unexplored part of its course. It may be surmised that its passage of the mountains is not unlike those of the Indus and Sutlej.

The distance between the gorges of the Indus and Sutlej is about 350 miles, and between the gorges of the Sutlej and the Sanpu or Dihong is about 1,000 miles. These three are the only rivers which, washing the northern base of the Himalaya in channels parallel to the range, break through the entire breadth of the range, and water the plains at its southern base.

Eastward of the meridian marked by the descent of the Sanpu into the plain of Assam, the Tibetan highland undergoes a wonderful change. Hitherto presenting for the most part a surface remarkable for its generally level, though very elevated character, and for the abundance of lakes which absorb its streams in their placid waters, it now exhibits an aspect of the utmost disruption; for all the rivers henceforward descending from the plateau cut up the eastern part of the highland into a succession of lofty ranges and deep gorges running north and south. These rivers include the branches of the Dihong and other affluents of the Bramaputra, also the great Yang-tse-kiang with its tributaries, which, after flowing southward as far as latitude 26° N., there turns eastward to traverse the whole of China proper. It is thought by some that the Cambodia river also originates in Tibet, and passes through this region. The Salween and the Irrawaddy have likewise been said to do so. Such is the uncertainty which awaits solution from future explorers.

The eastern limit of Tibet is near the Upper Yang-tse or Kincha, but the

eastern edge of the mountainous highland, where it descends into the plain of China, must be sought still further east, beyond the Yalung river; indeed, the river Min may be said to form its eastern base. On the north-east, the slope is defined by the basin of the Hoang-ho (Yellow River), which, rising on the north-eastern edge of the Tibetan plateau, traverses the Chinese government of Koko-nor, and the northern provinces of China proper, to empty itself now by a new channel into the gulf of Pechili.

From the Hoang-ho westward to the Mustagh, lofty mountains, under various names, form the northern edge of Tibet, and descend to the great pastoral plains of Gobi, in the Chinese government of Ili. These mountains are sometimes known as the Tsung Ling, or Mustagh, on the west, and the Bayan-Kara-Ula in the east; but the entire range is generally called Kuenlun. It terminates westward in the lofty peak or knot called Poosht Khar, or Tagh Dumbash, in which the Kuenlun, Himalaya, Pamir, and Hindoo Koosh unite. On the skirts of Gobi are the Turco-Mahomedan cities, formerly subject to China, but now in rebellion, beginning with Khotan, Yarkand, and Kashgar, and ending at Hami or Barkul, towards the Great Wall of China proper.

The passage of a succession of ranges and deep gorges, like those which have been shown to intersect the country between Lassa and China, cannot be otherwise than extremely difficult. Thus the route between Lassa and Bathang, after making a considerable detour northward, is described by Huc in terms which the reader may partly realise, by imagining a track across the Alps before such roads as the Simplon were made, and then intensifying his Alpine notions by doubling the altitudes.

These natural difficulties, however, are neither insurmountable to trade and intercourse, nor unlimited. They are not insurmountable, for the existing traffic is large, and only Europeans are debarred from it. They are not unlimited, for in the place of the mountains which are found between  $91^{\circ}$  and  $99^{\circ}$  east longitude, on the parallels of Lassa and Bathang, or about  $29^{\circ} 30' N.$ , it is only necessary to turn to the plain of Assam, in order to pass with facility as far east as  $97^{\circ}$  in  $28^{\circ}$  north latitude, and then a space of only two degrees divides Assam from the valley of the Yang-tse, in which Bathang and Likiang-fu are situated. The route from Assam is known to pass through a valley in which a Chinese or Lama governor, and a Lama high priest reside, so that the population must be of some importance. The mountains are probably crossed by passes which may be estimated between 6,000 and 10,000 feet above the sea. The Yang-tse flows at their base, and is followed by the great road into China.

The routes from the Irawaddy through Bamo, and from Rangoon and Moulemein through the Shan provinces of Burma and Siam, are well known, and constantly traversed by native traders. The French expedition from Cambodia followed the latter route from Kiang-hung on the Cambodia river, through S'mau or Esmok to Yunnan and the Yang-tse (Sprye's route). The French also visited Tali, on the Bamo route. It may then be concluded that the real obstacle to intercourse between Assam, British Burmah, and China is solely political.

From this cursory view of the central part of the vast Himalaya system, attention may now be turned to the eastern and western offsets.



## II.—THE EASTERN MOUNTAINS.

At the south-eastern angle of the mountains of Tibet, where the Bramaputra and the Yang-tse so closely approximate, the snowy mountains are contracted to their narrowest span, only to spread out again immediately, both eastward and westward. Westward, they pursue the course which the Bramaputra takes into the plains of Bengal. Eastward, they follow the Yang-tse to the China Sea, and separate its basin from that of the Canton river, and from the head-streams of Tonquin, Anam, and Cambodia.

Besides these outer arms, others spread themselves from the central knot through Burmah and Siam, and form the elevated plateau occupied by the Shans. That name closely resembles the name of the eastern highlands of Tibet, which is usually spelt Dzang. Both appear to denote mountains and mountaineers, as well as a probable identity of race on the part of the people.

Thus the ranges and table-lands, and even the people of South-eastern Asia, are naturally connected with the Himalayan system. The whole forms a subject of exceeding interest, but we must be content with saying a few more words upon the western arm of these offsets. It is the eastern frontier of India; and descending from the snowy knot or Langtang mountains, skirts Assam under the name of the Patkoi or Naga mountains. From the main range a spur is thrown off westward, until the Bramaputra takes its southerly course to the sea, and includes the Jynteea, Cosyah, and Garrow hills.

The Naga mountains separate Assam from the Burman Empire, and the basin of the Bramaputra from the basin of the Irawaddy. From Assam, the range bends southwards, and is called the Yomadoong mountains. It terminates at Cape Negrais. The crest of Yomadoong separates Chittagong and Aracan from Burmah; but the dependent principality of Munnipoor is partly on the eastern slope.

## III.—THE WESTERN MOUNTAINS.

The western extremity of the Himalaya, although separated by the deep gorge of the Indus from the central knot of Poosht Khar, or Tagh Dumbash, may be properly considered to be united with it, through a spur from Poosht Khar, which, passing between Gilgit and Chitral, meets the Himalaya on the banks of Indus.

From Poosht Khar, the western offset of the Himalayan system, descends, through the Hindoo Koosh, Suffeid Koh, the Suleiman mountains, and the Hala mountains, to the sea at Cape Monza, near Kurrachee.

From Poosht Khar also proceeds northward, the famous table-land of the Bolor mountains (the Pamir, Bam-i-duniah, or Roof of the World) separating the Chinese Empire from the Khanates of Turkistan, and uniting the mountains of Southern Asia with the Altai, in which the northern or Siberian slope of the continent culminates.

The Hindoo Koosh, the first division of the western offset, is a lofty range separating the basin of the Indus from the Oxus or Amu-daria. It is traversed by several passes, among which the most important connects Cabul and Balkh through Bamian. This pass is on a great trade route, it is well known, and controlled by the Afghan government. Some of the passes eastward have been

explored by Europeans, but they are not at present in the line of any great traffic. Here is the highland country called by the Afghans Kaffiristan, because the people have successfully resisted Mahomedan aggression, and remain possessed of their ancient faith and independence. The Hindoo Koosh ends at Bamian, for westward, although the range of mountains continues along the northern frontier of Persia, skirts the Caspian Sea, and unites with the Armenian plateau, it assumes other names, and ceases to be Indian.

The second division of the western mountains includes the Suffeid Koh, the Suleiman mountains, and the Hala mountains. These skirt the western bank of the Indus, and form the edge of an elevated plateau, occupied by the Afghans, as far as the Suleiman mountains, and by Belooch tribes along the Hala range. The Suleiman mountains attain an elevation of 11,000 feet in the Takht-i-Suleiman, but the Hala range is lower.

The principal part of the trade at present existing between India and Central Asia, passes from the Indus over this Afghan plateau to Persia and Turkistan. From Turkistan it radiates towards the Russian territories on the one hand, and the Chinese on the other. The Chinese trade passes from Yarkand and Kashgar, through the succession of Mahomedan towns at the base of the Thian-Shan or Celestial mountains, to Sining in China proper. Sining is an entrepôt between China, Mongolia, Kokonor, and Tibet ; and by this roundabout route chiefly, is it reached from India at present.

The enfranchisement of trade and intercourse along the vast frontier which has been reviewed in this account of the northern mountains of India, is all that is wanting to open up a trade of unparalleled magnitude with countries abounding in raw products, and populations devoid of machinery and manufactories on a large scale.

#### IV.—THE SOUTHERN MOUNTAINS.

The southern part of the mountains of India form a triangular table-land extending through 20 degrees of latitude, having its base on the lowland of the Indus and Ganges, its apex near Cape Comorin, and its sides on the Bay of Bengal and the Arabian Sea. It bears a totally different aspect to the northern part. It is quite devoid of snowy peaks. The table-land seldom exceeds 2,000 or 3,000 feet. Mountains no higher than Ben Nevis are prominent features, although parts of the Western Ghauts exceed 5,000 feet. The culminating point is Dodabetta peak (8,640 feet), in the Neilgherry mountains at the southern extremity of Mysore. The familiar name of the Deccan or the South might be applied to the whole of this area, although it is usually restricted to its central part, and sometimes to the western part only.

But while the south yields in elevation to the north, it is surpassing in everything that constitutes the wealth of a state, except the enervated character of the people, which accounts for their many subjugations.

The northern edge of the southern mountains varies but little in its height above the plain. But its base presents widely different conditions. For it will be observed that while the main rivers flow always near and often quite close to the base of the southern hills in the basin of the Ganges, that part of those hills which faces the Indus is more than 300 miles from that stream. It is called

the Aravulli mountains, and culminates in Mount Aboo, 5,000 feet; it extends between the Runn of Cutch and the Jumna river.

These two divisions of the northern base, also differ materially in another respect. The Ganges lowland abounds with perennial rivers. The lowland between the Aravulli mountains and the Indus is an arid desert, almost riverless. The distinction may be thus explained:—The course of the Ganges runs *parallel* to the snowy mountains; it is seldom more than 200 miles from them; and is constantly receiving fresh supplies from their never-failing springs. The course of the Indus after it leaves the Himalaya, is at right angles to the face of those mountains; and the mouth of the river, together with the end of the great plain on one side of which it passes, is not less than 800 miles from the mountains. Throughout this long course it only receives one important tributary; for the five rivers which leave the Himalayas to supply the Indus, form three only within 100 miles beyond the hills, and two only at a distance of 50 miles further. The five have been merged into the Indus, within 250 miles of the northern hills; and the Indus alone skirts the western edge of the broad plain, for the remainder of its length, about 300 miles. As the plain between the Ghara-Indus and the Aravulli range is nearly 300 miles wide and totally devoid of a permanent stream, it is easy to understand that the Indus plain is a desert, while the Ganges plain is abundantly watered. These results are intensified by the extreme action of the vertical sun during the solstice,—a potent cause deserving more attention than it has received.

The Aravulli range is also distinguished from the Ganges hills by the straightness of its course, and by the altitude of Mount Aboo at its southern extremity. Along the Ganges, the southern hills alternately recede and advance, so as to form a succession of deep bays, around which the hills arise sometimes with gradual slopes, often precipitously, and occasionally in isolated forms, which the natives fortified. They nowhere attain to the height of Mount Aboo, and seldom exceed 1,000 feet. They have no general name. Perhaps to call them the Ganges hills would not be unsuitable. Their eastern extremity is the Rajmahal hills.

The Rajmahal hills connect the eastern slope of the southern mountains with the northern. Between the Rajmahal and the Bay of Bengal at Balasore, the southern mountains rise very gradually from the delta of the Ganges, but among them is the isolated Mount Parasnath, 4,000 feet, with a temple on its summit.

From Balasore southwards to Lake Chilka, the Cuttack hills rise from the maritime plain at a distance of about 20 miles from the sea. Between Lake Chilka and the Cauvery river, the mountains take the name of the Eastern Ghauts, and sometimes attain an elevation of 3,000 feet. North of the Cauvery, the mountains turn away from the Bay of Bengal, and presenting their faces to the south, attain their highest elevation in the Neilgherry and Kundah mountains, which descend to the Arabian Sea. Southwards, the Gap of Coimbatore connects the lowland of the west coast with that of the Bay of Bengal, and separates the Kundah mountains from a lofty range which extends nearly to Cape Comorin. The lowland between the Eastern Ghauts and the Bay of Bengal, is divided by the Kistna river, between the Northern Circars on the north and the Carnatic on the south.

The edge of the southern plateau towards the Arabian Sea, from the Gap of Coimbatore to the Taptee river, is called the Western Ghauts. The Ghauts derive their name from the numerous gates or passes through the mountains, by which the highland is ascended from the coast. Between the Taptee and the neighbourhood of the Bhore Ghaut, the elevation does not generally exceed 3,000 feet. The Bhore Ghaut is traversed by the Great Indian Peninsula Railway between Bombay and Poona, the summit level being 1,770 feet. A degree further south, in lat.  $18^{\circ}$ , at Mahabuleshwar, a sanitarium, or summer resort, the height exceeds 5,000 feet; and in Coorg 6,000 feet. The breadth of the range is usually about 10 or 12 miles; although spurs sometimes advance across the plateau for 30 miles; and in Mysore and Coorg the mountains are 40 miles wide.

Although extremely rocky, steep, and precipitous, the Ghauts are covered with magnificent forests wherever the trees can take root. Warmth and moisture everywhere yield vigorous vegetation. The cocoa-palm luxuriates in the sands of the sea-shore; rice is cultivated in the rich soil at the foot of the hills; fruit trees surround the villages on the rising ground; forests of teak range along the mountain side, where the fragrant sandal wood also abounds; higher up the bamboo yields forests of canes like tall trees.

Between the Taptee and the Nerbudda, the Sautpoora mountains approach the coast; and from the Nerbudda to Mount Aboo, rugged slopes descending from the Malwa plateau connect the Vindhya mountains with the Aravulli range.

The maritime plain on the west coast is generally narrow, hilly, and intersected by the estuaries of the mountain streams. Below the Western Ghauts it seldom exceeds 30 miles in width. Between  $13\frac{1}{2}^{\circ}$  and  $14\frac{1}{2}^{\circ}$  north latitude the mountains advance to the sea. The northern plain is called the Concan; it contains the harbour of Bombay, formed by a range of rocky islets. The southern is divided between Canara on the north, and Malabar on the south.

North of the Taptee, the lowland forms the plain of Guzerat, between the slopes of Malwa and the mountains of the peninsula of Kattywar, and the island of Cutch. It extends to Mount Aboo, where it joins the great plain of the Indus. Its length is about 250 miles, and 120 in breadth.

In describing the southern portion of the Indian mountains the method employed in the northern part has not been adopted; for here no great masses strike the eye and assist the arrangement. The outline has to be traced in order that the mass may be distinctly viewed. This having been briefly done, the natural partition of the groups composing the division will be attempted.

1. The first group is very distinctly defined by the Aravulli mountains; by the Ganges hills including the northern face of the Kymore range; by the southern face of Kymore skirting the river Sone; and by its continuation along the Vindhya mountains which rise abruptly from the Nerbudda. The Salamber ranges, or the slopes from the Malwa plateau which connect the Vindhya with the Aravulli, complete the circuit.

This distinct group is subdivided both politically and naturally. Politically

it includes part of Rajpootana and the Indore Agency, isolated portions of the North-West Provinces, and a corner of the Central Provinces. Naturally, the Aravulli mountains and the Chittore hills, separated by a broad plateau, may be proved, by the light of drainage and contouring, to be an orographical unit, or one good natural subdivision.

Again, the famous plateau of Malwa, is well separated from the lower plain of Haraouttee by the Mokundurra range; and it may be easy to divide it from the Aravulli-Chittore subdivision by following Mokundurra up to the water-parting of the Bunas and the Mbye. Thence crossing the Mbye by the Salamber ridges to the Vindhya mountains, the edge of this plateau continues along the latter at least as far as the Betwa basin. Here the relations of Bundelcund and the Kymore plateau with Malwa, remain to be determined; and in the present state of the surveys, the further discussion of the subject must be postponed.

The rest of the southern mountains will be still more briefly described.

2. The Sautpoora mountains form the second group. Their limits are well defined by the Nerbudda on the north, and the Taptee on the south; also by the plains of Nagpore and Berar, and the plain of Chutteesgurh. On the eastern edge of the highland is the summit of Omerkuntuk, 4,500 feet, famous for a temple resorted to by multitudes of Hindoo pilgrims.

Of all the great rivers of Southern India, the Nerbudda and Taptee alone flow westward into the Arabian Sea. The Nerbudda also forms a continuous valley with that of the Sone; and thus the lowlands of Guzerat and the Concan are connected with the Ganges plain.

A mountainous plateau extends in continuation of the Sautpoora mountains as far as the Ganges, where it terminates in the Rajmahal hills. This highland is bounded by the Sone on its north-west face, which descends steeply to that river, and is divided by it from the Kymore range. The south-eastern slope of the plateau is towards the Bay of Bengal, and it is drained by the Mahanuddy, Braminy, Byturnee, Subunrika, and Damooda rivers.

3. The Northern Ghauts, rising from the southern bank of the Taptee, form a well-defined range, dividing the Taptee from the Godavery river. Here are the Cave Temples of Ajunta, and the battle-field of Assaye.

4. From the southern base of the Northern Ghauts to the northern edge of the plateau of Mysore, the Deccan is comparatively depressed. It includes the greater parts of the Godavery and Kistnah basins. Politically it is divided between the Bombay Presidency on the west, and Hyderabad or the Nizam's Province on the east.

5. The plateau of Mysore is the highland from which descend the southern affluents of the Kistna, the Upper Cauvery, the North Pennar, and the South Pennar. Its average elevation is about 2,000 feet, but its eastern part, about Bangalore, is 3,000 feet.

Coorg and the Neilgherries have been already alluded to in the marginal survey. The Shevaroy hills, north of the Cauvery, and similar isolated groups in the Carnatic, may be considered as outliers of the Eastern Ghauts.

6. The mountainous country between the Lower Godavery and the Mahanuddy, forms another group which the surveys have not yet completely delineated. It includes part of the Central Provinces, and the Jeypore Agency.

In the next chapter many of the mountains will be again noticed with especial reference to their function as waterpartings. In that point of view various details will be brought forward in addition to the brief account now concluded.

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## THE RIVER BASINS OF INDIA.

### INTRODUCTION.

The following is a brief account, not so much of the Indian rivers themselves, as of the natural drainage system to which they belong.—I. The nomenclature of the subject is explained. II. The connexion of the Indian rivers with the drainage of the Asiatic continent, and with the oceans, is defined. III. A general view is presented—Of the watershed of the Bay of Bengal, which is wholly Indian;—IV. Of the Indian part of the watershed of the Arabian Sea;—V. Of the watersheds forming the counterslope to the Indian system, and uniting in the same waterparting. VI., VII., VIII., IX. The Indian watersheds are afterwards specially described according to their division into the separate basins drained by each river with a distinct outfall.

### I. THE NOMENCLATURE.

The natural drainage systems form the most simple and exact basis upon which every branch of geography can be studied and brought into combination. The boundaries are defined by nature, they are easily traced, and capable of precise delineation. A RIVER BASIN, whether small or large, whether confined to a single valley and stream, or embracing every variety of mountain and plain, hill and vale, gentle stream and rushing torrent, is a geographical unit complete in itself. It is the whole area from which the surface waters flow through one ultimate outlet. In like manner, all the basins contributing to the same ocean, sea, or line of coast, may be grouped together as an OCEAN, or SEA BASIN, or as a MARITIME WATERSHED.

The boundary of a basin is the WATERPARTING or summit of the slopes within which a river and all its affluents have their sources. The German name for it is "*Wasserscheide*," the verb *scheiden* meaning to divide or part. Through similarity of sound, the German word is often incorrectly translated by the English word "watershed," the proper use of which will be explained presently.

The waterparting, at the same time that it is the summit of the slopes of a given basin, also divides or parts it from contiguous basins. Lavallée calls the waterparting "*la ligne ou faite de partage des eaux*," and Carl Ritter describes it as "the mathematical line from which the descent of rivers begins." The term is equally applicable to the division of the secondary and inferior basins

drained by affluents. So also it is applied to the division of one ocean or sea basin from another, and of any maritime watershed from another. It is not always the ridge of a range of hills or mountains, for it often happens that sources springing up in the same valley or plain flow in opposite directions, and have distinct outfalls far apart. Moreover the loftiest ranges are sometimes intersected by rivers which rise in elevated valleys beyond them.

From the waterparting, the basin slopes towards the watercourses and their outfalls. The slopes form the true WATERSHED, called by the French geographers "*la versant*." The identification of *versant* with slope, and not with waterparting, is unquestionable; and the translation of *versant* by watershed is indicated by the English rendering of other applications of the French verb "*verser*." Thus *verser le sang*, to shed blood, *verser des pleurs*, to shed tears. In German the slope or watershed (*versant*) is called "*Abhang*," but never "*Wasserscheide*." If watershed be identical with slope, then it cannot be the waterparting which divides contrary slopes, as some say.

The WATERCOURSE is the base of the slopes which have their summit in a waterparting. It is the "*cours d'eau*" of the French, and the "*Rinnsal*" of the German geographers, and forms a continuous descent from every source to its ultimate outfall.

The foregoing terms are the most essential in the study of river basins. For other details the reader should consult the excellent French work of Lavallée, or the translation of it, edited by Captain Lendy.\*

## II.—THE CONNEXION OF THE INDIAN RIVERS WITH THE DRAINAGE OF THE ASIATIC CONTINENT, AND WITH THE OCEANS.

The natural drainage of Asia divides the continent into northern, southern, eastern, western, and inland watersheds. The northern has its outfall into the Arctic Ocean; the southern contributes to the Indian Ocean; the eastern watershed belongs to the Pacific; the western is confined to the Asiatic slopes of the Black Sea and the Mediterranean, while the inland watershed embraces a vast extent of the interior, drained by considerable rivers which end in numerous lakes of all sizes. The largest of the inland lakes of Asia is the Caspian, having an area of 178,866 square miles, a length of 800 miles, a depth of 422 fathoms, while its surface is ordinarily 84 feet below the level of the ocean.

The rivers of India belong to the southern watershed of the continent, which advances upon the Indian Ocean in three vast promontories or peninsulas. Of these, the central is India, the western is Arabia, and the eastern contains British Burmah, Burmah, Siam, Cambodia, and Assam, or South-eastern Asia.

Two great recesses of the Indian Ocean separate India from Arabia and the eastern peninsula, namely, the Bay of Bengal and the Arabian Sea. Hence the Indian watershed is divided into two parts, one of which drains into the Bay, and the other into the eastern side of the Arabian Sea. On the west the Arabian Sea extends, through the Red Sea and the Persian Gulf, two long arms

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\* *Geographie, physique, historique, et militaire*; par Th. Lavallée. Paris, 1865.

Physical, historical, and military geography; from the French of Th. Lavallée. Edited by Captain Lendy. London, 1868.



towards the Mediterranean and Europe, inviting communication with India. The line by the Persian Gulf is direct, but at present it is only made available for rapid communication by the telegraph. Its development urgently demands a railway along the Euphrates valley. The longer line by the Red Sea now enables steamships to pass from the Indian Ocean to the Mediterranean by the Suez Canal. But the Isthmus of Suez is still a waterparting, for the waters of neither basin flow from one into the other. Even when the tides in the Red Sea rise to the height of nine feet, the current only sets up the canal as far as the Bitter Lakes. So also the Mediterranean, which only has a tidal rise of one foot, sends its tidal current no further than Lake Timsah.

### III.—A GENERAL VIEW OF THE WATERSHED OF THE BAY OF BENGAL.

The watershed of the Bay of Bengal includes the whole of India eastward of the Western Ghats and the Aravulli range, except the narrow valleys drained by the Nerbudda and Taptee, which serve in a remarkable manner, by a reversal of the general slope, to divide the Deccan on the south from the plateau of Malwa on the north.

Besides India the watershed of the Bay of Bengal includes a large part of Tibet in the Chinese Empire, and the whole of the kingdom of Burmah. South of Burmah the watershed of the Bay is contracted within the limits of the western slope of the very narrow but elevated tongue of land, which, under the name of the Malay Peninsula, separates the Bay of Bengal from the Gulf of Siam and the China Sea.

From Cape Comorin, at the southern extremity of India, in  $8^{\circ}$  north latitude, the vast watershed of the Bay of Bengal extends as far north as the 34th parallel, or 26 degrees of latitude, equal to 1,800 miles. In the contrary direction, it reaches from  $74^{\circ}$  to  $99^{\circ}$  of longitude east of Greenwich. Its breadth thus nearly equals its length. But the multiple of the length and breadth would give a very exaggerated idea of the area of the land extending between them, for the waters of the great Bay and the northern limits of the basin approach within 600 miles; and the watershed is scarcely ever more than 900 miles from the Bay, while in the Malay Peninsula it narrows down to a mere fringe.

The surface of this vast watershed differs extremely, and presents those differences on a great scale and in well-defined forms. Thus from Cape Comorin to the southern waterparting of the Ganges, the rivers drain a table-land generally above 2,000 feet above the sea, but surrounded by the Ghats, which usually rise to 3,000 feet, and sometimes to greater altitudes, nearly up to 9,000 feet. This is the plateau of Southern India, or the Deccan. Only a very narrow plain divides the plateau from the shores of the Bay.

From the northern edge of the southern plateau the ground descends by rugged slopes to the low plain of the Ganges and Bramaputra, where, especially in the Delta, land and water struggle for existence on a level with each other. The plain, exceeding the plateau in length, stretches out to 1,100 miles, and has a breadth of 350 miles between the Sunderbunds and British Sikkim.

The contrast between the plain and the southern plateau only serves to render more remarkable the huge snowy mountains, the Himalaya, which bound the



plain on the north, and form the buttresses of the elevated mass which terminates the watershed in this direction.

Throughout these three divisions the general course of the rivers is from west to east, but in the remainder of this watershed, on the eastern side of the Bay, the rivers flow from north to south. These include the streams of the Aracan coast, also the Irawaddy, Sittang, Salween, and Tenasserim rivers. This is a country of hill and valley, mountain and plateau, uniting in some respects the features that are distinguished apart in the other divisions. The narrow slope which characterises these eastern shores of the Bay of Bengal will be found to have its counterpart on the same side of the Arabian Sea, the subject of the next chapter.

#### IV.—A GENERAL VIEW OF THE INDIAN WATERSHED OF THE ARABIAN SEA.

The Indian part of the watershed of the Arabian Sea covers an extent of latitude exceeding that of the Bay of Bengal, but it includes a much smaller area. For in Southern India this area only consists of the narrow and partly precipitous slope between the summits of the Western Ghauts and the coast line. Here, nevertheless, the rivers are numerous and also important, for at their mouths are many navigable creeks and inlets, which form the best harbours in India. This group extends from Cape Comorin to the southern limits of the Gulf of Cambay.

The next part of the Indo-Arabian watershed includes the Taptee and Nerbudda rivers, already mentioned; with which may be included the Myhee, Loonee, and other small streams descending from the plateau of Malwa and the Aravulli range. The riverless desert which separates the Loonee from the Indus may also be taken with this group.

The third part of this watershed is the basin of the Indus alone. This river extends the watershed of the Arabian Sea into a latitude still higher than that reached by the basins of the Bay of Bengal. With its southernmost limit in Cape Comorin, the basin of the Indus carries its most northerly part up to the summits of the Hindoo Koosh and Karakorum mountains, in  $36\frac{1}{2}^{\circ}$  north latitude, or more than two degrees further north than the waterparting of the Bay of Bengal. On the west, the waterparting of the Indus includes territories on the plateau belonging to Kelat or Beloochistan and Afghanistan, while on the north-east it is found on the much higher plateau within the Chinese dependency of Tibet.

The Indo-Arabian watershed, although restricted to the verge of the coast in Southern India, and still confined to narrow limits in the next group, makes in the basin of the Indus some approach to the magnitude and importance of the eastern watershed; for here it expands to a breadth of 800 miles, between the sources of the Indus and those of its affluent from Cabul. But these dimensions become reduced to 100 miles in its lower course through the province of Sinde. Still the Indus exceeds the Ganges in length, and vies with it in area.

V.—THE EXTERIOR WATERSHEDS FORMING THE COUNTERSLOPE TO THE INDIAN SYSTEM, AND UNITING IN THE SAME WATERPARTING.

1. *The Belooch Basins and the Western Watershed of the Arabian Sea.*

The limits of the Indian basins are defined by a continuous waterparting from Cape Monze to the Malay Peninsula. The waterparting is at once a line of separation dividing the Indian from the rest of the Asiatic basins; while under another aspect it is a line of junction, uniting the Indian with the ulterior slopes.

The political boundary of British India extends westward as far as the Hubb river, which is separated from the basin of the Indus by the watercourse and creek on which Kurrachee stands. The political boundary follows the left bank of the Hubb from its mouth upwards for about 60 miles; and then turning eastward into the basin of the Indus, continues far within that basin, along the remainder of the western frontier.

The waterparting commencing with Cape Monze, after separating the Hubb from the Indus basin, divides the Poorallee and other rivers of the Mekran coast, from the channels which trend towards the Indus by the Gundava pass. Near Khelat, it becomes the waterparting of the Arabian Sea, passing around the Indus northward and eastward, while westward it deflects nearly at right angles to skirt the Mekran coast and the Persian Gulf, till it reaches the basin of the Euphrates and Tigris at the head of the Gulf.

After enclosing the basin of the Euphrates and Tigris, the waterparting of the Arabian Sea divides the Jordan from the Mediterranean, and crossing the Isthmus of Suez, separates the western drainage of the Red Sea from that of the Nile, and then turning eastward it skirts the southern shores of the Gulf of Aden and ends at Cape Guardafui.

Thus the Western Ghauts of Southern India, the Aravulli mountains, the Western Himalaya, Gangdisri, Karakorum, Hindoo Koosh, Afghan, Belooch, and Persian mountains, Ararat, Taurus, Lebanon, Sinai, and the Abyssinian and Somali mountains,—unite in forming the waterparting of the great system of the Arabian Sea.

The unity of this vast area is indicated not only by these hydrographical conditions, the ethnological elements almost equally proclaim it. In all parts, the Arab is at home, formerly as a conquering missionary, then and now as soldier, sailor, settler, and trader. In the Concan and the Punjab, as in Syria and Nejd,—on the Nerbudda and Indus, as on Tigris and Euphrates, in the Thur as in the Nufood,—the Arab finds his kinsmen, his habits, and his faith.

V.—2. *The Inland Basins.*

i. Lake Seistan.

Where the northern waterparting of the Mekran streams meets that of the Indus, a peculiar drainage system begins, and continues in contact with the Indian basins as far as the eastern part of the high plateau of Tibet. The peculiarity consists in the fact that while on the Indian side the streams fall into the sea, on the other side they feed numerous inland lakes, which have no outlet.

The first in this series is the basin of Lake Seistan, which receives the Helmund and other streams from the western slope of the plateau of Afghanistan. It is this lake and its shores thus intimately pertaining to Afghanistan, which the Persians have recently seized. The Helmund basin includes the principal part of the watershed of Lake Seistan. It lies immediately north of the Mekran portion of the waterparting of the Arabian Sea. On the east it is conterminous with that part of the Indus basin which contains the Cabul, Koorum, and Gomul rivers; except where the small and distinct basin of Lake Ab-istada intervenes. The principal source of the Helmund is 11,500 feet above the sea, not far from the Bamian pass in the Koh-i-Baba mountains, where that range joins the western extremity of the Hindoo Koosh.

On the north, the basin of Lake Seistan is separated by the Koh-Siah or Gour mountains from the Heri or River of Herat, which terminates in the Desert of Khiva. On the west it is divided from the Caspian by the Persian plateau, which, surrounded by mountains that give rise to numbers of perennial streams, absorbs in its thirsty sands all but one or two that feed small lakes like that of Neyriz or Bakteghan.

#### V. 2.—ii. The Inland Basin of the Oxus and Aral Sea.

Following the Indian waterparting, the next to the Seistan basin on the north is that of the Oxus. The Koh-i-Baba mountains divide the Oxus from the Seistan basin, where it is drained by the Helmund, and the Hindoo Koosh separates it from the Indus basin, where the latter is drained by affluents of the Cabul river.

The Oxus, or Amu-daria, is said to have flowed formerly into the Caspian Sea, which is 84 feet below the level of the ocean. But now the Oxus is, like the Jaxartes or Syr-daria, a feeder of the Aral Sea, which is about 30 feet higher than the ocean.

The lower part of the Oxus basin forms the Khanate of Khiva; the middle belongs to Bokhara; and the uppermost, including Balkh, Badakshan, and its dependencies, pertains to the Afghan dominions. The Zarafshan is naturally a branch of the Oxus, but irrigation absorbs its waters in the gardens of Bokhara. A lofty spur descending from the junction of the Bolor mountains, or Pamir, with the Thian-Shan or Celestial mountains, divides the Zarafshan from the Jaxartes, where the Khanates of Bokhara and Kokand are confronted by the ultimate limits of the Russian Empire.

The only source of the Oxus yet explored is Lake Victoria, or Sir-i-kul. It was discovered by Lieutenant, now Captain Wood, of the late Indian Navy, in 1836, at an altitude of 15,600 feet above the sea, near the summit of the Pamir or Bolor mountains, which divide the Oxus from the basin of Lake Lob. The high mountains of Pamir are united with the Hindoo Koosh from the west, and the Karakorum from the east, in the mountain knot of Poosht-i-Khar or Tagh-dumbash, the latter being a Turki name signifying "The Mountain Head." From this central knot (the Mount Gothard of Asia), descends the Oxus to the Sea of Aral, the Daria Tagh-dumbash to Lake Lob, both on the exterior watershed; while on the Indian watershed it sends the Gilgit river south-eastward to the main Indus, and the Chitral or Kooner south-westward to the Cabul affluent.

## V. 2.—iii. The Inland Basin of Lake Lob.

The basin of Lake Lob is separated from that of the Indus by the Karakoram mountains, beginning on the west with the central knot of Tagh-dumbash, and extending eastward to the pass dividing the Changchenmo valleys from the affluents of the Karakash and Yarkand rivers.

The principal river falling into Lake Lob is the Tarim, the affluents of which wash Kotan, Yarkand, Kashgar, and other Turco-Mahomedan cities. These streams have their sources in snowy mountains which certainly rise to 20,000 feet above the sea, while Lake Lob is not more than 3,000 feet in altitude.

This region formed the Thian Shan Nan Lu, or Southern circuit of the Celestial mountains in the Chinese dependency of Ili, until a recent rebellion drove out the Chinese and substituted for their authority that of the Turki-Mahomedans. In struggling to maintain his newly-acquired power, not against the Chinese who have remained quiescent so far, but against other rebels, the present chief has consented to throw open this important country to Indo-European trade. This object was steadily resisted by the Chinese, and they continue to do so along the whole of the remainder of their frontier, which still encircles India for 1,500 miles from Cashmere to Burmah. It is only at the Court of Peking that measures can be pursued for the removal of this vast and almost inconceivable obstruction, which prevents intercourse between the most populous countries in the world. The opening of trade with the extremity of this immense frontier, through the influence of a rebellion which can scarcely be permanent, may perhaps be the means of bringing about arrangements with the Chinese for the general establishment of inland trade between China and India.

## V. 2.—iv. The Inland Basin of the Tibetan Lakes.

Next to the basin of Lake Lob, succeeds the system of inland lakes which are said to receive a large part of the drainage of the high plateau of Tibet. In Lake Lob the lofty mountains which enclose it on three sides, and often supply their streams from perpetual snow, find an outlet for them within 3,000 feet of the sea level. But the lakes which mark the lowest depressions on the inland system of the Tibetan plateau are probably never below 14,000 feet above the sea.

The Indian waterparting divides the Tibetan system from the Indus basin on the west, and from the Sanpu or Bramaputra basin on the east. The only part of the Tibetan lake basins explored by Europeans is the western extremity crossed by the Changchenmo route between the Punjab and Yarkand. North of the Changchenmo pass, a plain extends towards Khotan and Yarkand, at an altitude of 17,000 feet above the sea. It is bare and white with saline matter in summer, drains into shallow lakes, and is probably the western extremity of a vast extent of the Tibetan highland, with similar features. The native Indians trained as surveyors by Major Montgomerie have made some important additions to the knowledge of this area, and have reported the existence of gold-fields, employing hundreds of miners, besides other evidence of industry and natural wealth. The largest lake among the Tibetan basins is said to be Tengri Nor,

north of Lassa, to which the Tibeto-Chinese surveys give a length of 100 miles, but no European has seen it.

### V.—3. *The Yellow Sea Basins.*

The Indian waterparting passes from the Tibetan division of the inland watershed of the continent to one of the grandest basins of another great watershed, viz., the basin of the Yang-tse-kiang, which forms a part of the eastern maritime slope, and falls into the Yellow Sea, a part of the Pacific Ocean.

The Yang-tse rises on the north-eastern edge of the plateau of Tibet, and descends by vast gorges to the plains of China, through which it flows to the Yellow Sea near Shanghai.

The Indian waterparting separates the Yang-tse from the Bramaputra, and perhaps from the Irawaddy and the Salween. The eastern extremity of the plain of Assam in British India is within 150 miles of its course, and the exploration of the interval is one of the most pressing objects of geographical enterprise. But the relative position of the Yang-tse to the basins of the Bramaputra, Irawaddy, Salween, and Cambodia rivers, is now involved in doubt, and can only be cleared up by future surveys.

### V.—4. *The China Sea Basins.*

The eastern extremity of the Indian waterparting before it reaches the Malay peninsula divides the Salween from the upper course of the Mekong or Cambodia river, and from the Menam which washes Bangkok, the capital of Siam. The Mekong empties itself into the China Sea at the entrance of the Gulf of Siam. The French are in possession of the territory at its mouth, and have recently sent an expedition up the river into China. The Menam empties itself into the bottom of the same gulf. Thirty years ago Captain, now Major-General McLeod crossed the upper part of the Menam basin on his journey from Maulmein at the mouth of the Salween to Kiang-Hung on the Cambodia river, with a view to an overland trade with China. The same part of the Menam was also visited at that time by Dr. Richardson, and to these explorations in this quarter but little has been added since. But it is said that the enlightened kings of Siam have now undertaken surveys of their territories.

In the Malay peninsula the waterparting forms a range of varying elevation, sometimes exceeding 6,500 feet. At the Isthmus of Kraw the height is said not to exceed 75 feet. The exterior watershed descends to the Gulf of Siam and the China Sea, but its numerous streams are of no note.

## VI., VII., VIII., IX.—THE INDIAN WATERSHEDS.

### VI. THE BASINS OF THE BAY OF BENGAL.

The basins of the Bay of Bengal may be divided into two unequal groups:—first, those which have their outfall on the western side of the Bay, between Cape Comorin and Chittagong; secondly, those which belong to the eastern side.

The western basins of the Bay of Bengal contain the Ganges, and Bramaputra, Subunreka, Byturnee, Braminee, Mahanuddy, Godavery, Kistna, Pennaur,

Palar, Penar, Vellaur, Cauvery, Vigay, Vypar, Tamberpurny, and intervening groups of distinct streams, too small to be worthy of separate notice.

Arranged according to magnitude, the Ganges and Bramaputra are of the first class; the Godavery and Kistna, of the second; the Mahanuddy, Pennaur, and Cauvery, of the third; and the remainder before named of the fourth. The groups of inferior streams form a fifth class.

#### VI.—1. *The Ganges Basin.*

The basin of the Ganges is bounded on the north by the northern or inner range of the Himalaya mountains, which divides it from the Sanpu and Sutlej, as far as those rivers wash the northern base of that range.

On the west the waterparting crosses from the northern or inner range to the southern or outer culminating range of the Himalayan system, by way of a ridge which divides the heads of the Baspa, an affluent of the Sutlej, from the western heads of the Bhagirati branch of the Ganges. The waterparting follows the southern range of peaks from the east of the Boram pass to the west of the Borenda pass, dividing the Jumna (the chief affluent of the Ganges) from the Baspa. Then it runs along the great spur descending towards the plains along the left bank of the Sutlej as far as Simla, dividing the Sutlej first from the Parbar, and next from the Giri, both tributaries of the Jumna.

From Simla, the waterparting proceeds southward and then eastward, following the course of the Giri towards its confluence with the Jumna, which takes place in the Doons or valleys between the Sewalik hills and the base of the Himalaya mountains.

From the right bank of the Giri, the waterparting of the Ganges basin turns sharply to the south, skirts the head of Kyarda Doon, crosses the Sewalik hills, descends to the great plains where it separates the Jumna from the Sarsuttee and Chittung, and continuing along the Aravulli range, and the Salamber edge of the Malwa plateau, reaches its southernmost limits in the Vindhya mountains.

The Vindhya mountains, called also the Kymore hills towards the east, form the southern waterparting of the Ganges basin as far as it is conterminous with the basin of the Nerbudda. The waterparting then crossing the continuous valleys of the Nerbudda and Sone, separates those streams, and follows the range which connects the Sautpoora mountains with the Rajmahal hills. From this range the waterparting descends to the coast between the mouths of the Hoogly and Subunreka.

The eastern waterparting separates the basins of the Ganges and the Bramaputra from the Himalaya mountains to the Delta. As these great rivers unite in a common delta, although they approach each other from opposite points of the compass, they may be considered as parts of the same basin. But their equal grandeur and distinctive features make it desirable to describe them apart.

The principal affluents on either side of this division of the waterparting, are the Teesta which joins the Bramaputra, and the Mahanuddy which joins the Ganges. At the foot of the Himalaya mountains the Mahanuddy approaches nearly to the Teesta. The waterparting ascends the mountains towards

Darjeeling by the Sittong and Senchal mountains, then deflecting westward to the Tongloo mountain, it turns again northward to Singaleela mountain, and reaches the outer range of Himalayan summits in Kanchinjinga, 28,156 feet above the sea. The waterparting follows this range eastward by Chomiomo to Bhomtso mountains where it turns northward, dividing the heads of the Arun river, an affluent of the Coosy (one of the great feeders of the Ganges) from a tributary of the Sanpu. Thus the northern range of the Himalaya which divides the Sanpu from the Ganges is reached. In these regions geographical knowledge is limited to the routes of Capt. Turner, Dr. Hooker, and Major Montgomerie's pundits; but it is high time that a resolute effort should be made to render them accessible to European science.

#### VI.—2. *The Bramaputra Basin.*

The waterparting of the Bramaputra is conterminous with that of the Ganges, from the source of the former to the confluence of the two rivers in the Delta of Bengal.

The upper part of the basin is entirely in Tibet, and divides the broad plateau drained by the very elevated Tibetan lakes, from the narrow plateau which divides the northern and southern Himalayan ranges, where the affluents of the Ganges spring from perennial snow.

At the western extremity of the basin, the main river is 14,000 feet above the sea, and after a course of 600 miles it is still 11,000 feet high. Nothing is known of its passage across the Himalaya mountains, but there is little doubt that it is the same river as the Dihong, which joins the Bramaputra in the plains of Assam. The features of the passage are probably similar to those exhibited by the gorge of the Sutlej; but it is a reproach to the science and enterprise of the 19th century to allow such a subject to remain unsolved.

Eastward the basin of the Bramaputra is bounded by that of the Yang-tse, which here flows through tremendous gorges on its way to the plains of China and the Yellow Sea. Some contend that the basins of the Irawaddy, Salween, and Cambodia rivers, are interposed between the Bramaputra and the Yang-tse, although they approach each other within 150 miles.

On the south, the Patkoi mountains, terminating in the Muneepore and Chittagong hills, separate the Bramaputra from the Irawaddy, and the basins of the Aracan coast.

#### VI.—3. *Basins between the Ganges and Godavery.*

A group of small basins belonging to the Bay of Bengal, separates the lower course of the Ganges from that of the Godavery. The Nerbudda and Taptee belonging to the Arabian Sea intervene between the upper courses of the same great rivers. The small basins in question drain the southern slope of the range which extends from the Sautpoora mountains to the Rajmahal hills on the banks of the Ganges. The northern slope is drained by the sources of the Nerbudda and the affluents of the Sone. The basins formed by the southern slope include the Subunreka, Byturnee, Braminee, Mahanuddy, and some minor basins fringing the coast between the mouths and basins of the Mahanuddy and Godavery. The Mahanuddy is by far the largest of the group. It drains the



fertile plain of Chutteesgurrh in the Central Provinces and washes Cuttack. It is 520 miles long, and is navigable by boats for 460 miles from the sea.

#### VI.—4. *The Godavery and Kistnah Basins.*

These great basins of the second class of magnitude, with the smaller basin of the Pennaur, drain the greater part of Southern India, including parts of the Central Provinces, Hyderabad, and the Ceded Districts; or the whole of the countries within the Eastern, Western, and Northern Ghauts, as far south as the latitude of Madras.

From north to south these basins extend for 700 miles, and more than 500 from east to west. Their outlets on the east coast are less than 80 miles apart. This circumstance does not appear to have attracted the commerce of the interior with the seaboard, for the tendency of trade is rather towards the western coast, from which these basins are only separated by the narrow seaward slope of the Western Ghauts, for a length of 500 miles.

This is partly attributable to the fact that the Kistna is too swift to be navigable; while the Godavery, which is navigable, generally descends to the sea by a succession of rapids through chasms of the Eastern Ghauts.

Great works have been executed to improve the passage of the Godavery; and in the course of time, with perseverance, the trade of the interior with the west coast may thus be advanced. At the same time the railways penetrating from Bombay into this region cannot fail to maintain the influence of that port. It is also to be observed that the principal traders between the coast and the interior, Parsees and Arabs, have their establishments in the ports of the west coast.

#### VI.—5. *The Cauvery Basin.*

The triangular area embracing the termination of the peninsula south of the parallel of Madras, forms a group of several small basins, of which the Cauvery is at once the centre and the chief. The basin of the Cauvery is conterminous with that of the Kistna on the north, and thence along the Western Ghauts it stretches for 250 miles. On the east it is separated by the basins of the Vellaur and Pennar from that of the Palar, which lies nearest to Madras. On the south, the Cauvery basin is bounded by the Vigay, which separates it from the Vypar and Tamberpurny.\* The last named washes Tinnevely, and is the most southerly river of note in India. Only some rivulets drain the slope between the outfall of Tamberpurny and Cape Comorin.

### VII.—THE EASTERN BASINS OF THE BAY OF BENGAL.

The Patkoi mountains terminating in the Muneepore and Chittagong hills separate these basins from the Bramaputra. They form the following groups:—

1. The basins of the Aracan coast from Chittagong to Cape Negrais.
2. The Irawaddy.
3. The Sittang.
4. The Salween.
5. The basins of the Malay peninsula.

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\* The Chindinthoora of the Indian Atlas, and Tambaravari of Thornton.



### VII.—1. *The Basins of the Aracan Coast.*

The maritime slope of the Yoomadounng mountains is drained by these basins. Its greatest width is 120 miles, from which it tapers to the southern extremity.

The Kurnafoolee river, which washes Chittagong, is the most northerly of the series. The Naaf divides the Lower Provinces from British Burmah. The Myoo, Kuladyne, and Lemyoo rivers fall into the sea near Akyab, where the country is a network of creeks and islands. The Talak and the Aeng are noted for passes which lead from them over the mountains into the kingdom of Burmah. From the Toungoop river a military road connects the coast with Prome in British Burmah. The Kintalee is the boundary between Aracan and Pegu.

### VII.—2. *The Irawaddy Basin.*

Separated by the Yoomadounng mountains from the Aracan basins on the west, and by the Patkoi mountains from Assam and the Bramaputra on the north, the eastern limit is formed by mountains which divide the Irawaddy from the Salween, until in approaching Pegu, the basin of the Sittang is interposed, and the Irawaddy in its lower course south of Ava takes a bend to the westward, and becomes restricted to the narrow valley between the hills or Yoomas of Aracan and Pegu.

The Irawaddy is navigable by steamers throughout the British province of Pegu, and beyond Mandalay, the capital of the kingdom of Burmah, as far as Bhamo, about 600 miles from the sea. From Bhamo there is an overland route to China, at present restricted to natives.

### VII.—3. *The Sittang Basin.*

This basin curiously interposed between the Salween and the Irawaddy, is in a direct line with that part of the latter river which lies between Ava and Bhamo. The valley of the Sittang running southward, is continuous with another sloping northward which meets the Irawaddy, and is prolonged by it in the same direction.

The waterparting of the Sittang in crossing this valley is but 400 feet above the sea, at a distance of 250 miles from it; so that although the Irawaddy affords continuous water-carriage from the sea to the capital of Burmah, and almost to the Chinese frontier, the Sittang appears to be the more direct and easy line of route for land-carriage.

The Sittang basin is bounded on the west by the Peguan hills, which seldom ascend to 2,000 feet. On the east it is flanked by the Poungloung mountains, which rise at once to heights of 3,000 to 8,000 feet, and form the edge of a mountainous table-land extending to the China Sea. The western part of this highland is the country of the Karens and Shans, and various unsubdued tribes.

### VII.—4. *The Salween Basin.*

The Salween is by some thought to rise in Tibet, but the best authorities are content to find its sources along with those of the Irawaddy in the snowy knot which lies eastward of Assam in latitude 28° N.

The Salween basin, although 800 miles in length, is very narrow, being generally less and seldom more than 100 miles broad. The main stream flows

through a deep gorge with a rapid current, often broken by cataracts, of which a formidable example occurs within 100 miles from the sea, and abruptly terminates the navigation.

The upper part of the basin is conterminous on the east with that of the Mekong or Cambodia river, recently explored by a French naval expedition, from the settlement formed by the French at its mouth. Lower down it is bounded by the Menam river, which belongs to Siam, and washes Bangkok, the capital of that kingdom.

At the mouth of the Salween is the harbour of Moulmein, south of which the basin is extended by the Attaran and other tributaries.

#### VII.—5. *The Basins of the Malay Peninsula.*

In the British territory this group forms a narrow slope nowhere more than about 80 miles in breadth, and sometimes less than 40. Still it finds room for the Tenasserim river, 150 miles in length, and navigable for 40 miles from the sea. The annual rainfall of nearly 200 inches accounts for this abundance of water.

The Ye and the Tavoy rivers have also distinct though small basins, as well as some other inferior streams. The Pakchan is a broad inlet which forms the beginning of the boundary between the British and Siamese dominions, and is divided from the Gulf of Siam by the Isthmus of Kraw, where the peninsula is contracted to a width of about 50 miles. It has been proposed to cross this isthmus both by canal and railway, with the expectation of diverting the China trade from the Straits of Malacca; but commerce still favours Singapore, and declines the shorter route.

#### VIII.—THE INDO-ARABIAN BASINS.

This system forms three distinct groups. The first extends from Cape Comorin, along the Western Ghats, to the entrance of the Gulf of Cambay. The second includes the Taptee and Nerbudda, with the small streams falling into the Gulf of Cambay and the Runns and Gulf of Cutch; also those which belong to the intermediate coast of Kattywar. The third is the Indus alone.

##### VIII.—1. *The Basins of the Western Ghats.*

The rivers which descend from the Western Ghats to the Arabian Sea between the Taptee and Cape Comorin are remarkable, not only for the shortness of their course compared with the immense quantity of water which they disgorge, but also for the contrast between the ravines, torrents, and cascades which characterise their upper parts, compared with the broad and placid estuaries and lagoons or back-waters, in which most of them terminate before reaching the sea.

In this brief notice only the principal will be specified, as they occur in proceeding from Cape Comorin northward.

i. The Perriaur descends from a lofty range clothed with forests, which forms the finial of the Western Ghats, and divides Travancore from Madura and Tinnevely. Before reaching the sea, near the harbour of Cochin, it spreads out into a series of navigable lagoons, or rather estuaries, developed in the direction

of the coast line. These form part of a chain of inland navigation extending for 200 miles along the coast from Trivandrum up to Trichoor.

ii. The Ponany rises in Coimbatore, and flows through the great depression in the mountains named Palghaut. The Madras railway follows its course. Boats navigate this river for 63 miles from the sea, and during the monsoon it floats down timber.

iii. The Naitravutty and Goorpoor rivers unite in the same estuary, which contains the harbour of Mangalore, once a naval dockyard and arsenal under the princes of Mysore. The river is navigable for small craft.

iv. The Caulynuddy empties itself into an inlet of the sea, which forms the port of Carwar. This 'port' was expected to attract the cotton and trade of Dharwar, but the shippers prefer Coomta.

v. The Rachol and Goa rivers surround the island of Goa in the Portuguese territory, and form magnificent harbours, which remain useless under their antiquated rulers.

vi. The Seo river, with the harbour and town of Dewgurh at its mouth, is in the collectorate of Rutnagherry.

vii. The Kunvee flows into the excellent harbour of Viziadroog.

viii. The Shastree is nearly a mile wide at its mouth.

ix. The Dubhul or Wasishtee river is a mile and a quarter wide at its mouth, and 6 to 10 fathoms deep inside the bar, which has 12 feet of water.

x. The Savitri or Mhar has the town of Bankote at its mouth, and is navigable for 30 miles.

xi. The Rajpuri inlet receives many small streams, and forms an excellent harbour without a bar. It was the naval arsenal of the Bejapoor kingdom, and was afterwards held by the Hubshees.

xii. The Amba, Oolas, and other rivers empty themselves into the harbour of Bombay.

xiii. The Damungunga forms the port of Damaun, belonging to the Portuguese.

## VIII.—2. *The Basins of the Gulf of Cambay, the South Coast of Kattywar, and the Runns and Gulf of Cutch.*

### VIII. 2.—i. The Taptee and Nerbudda Basins.

These basins divide the Ganges from the Godavery and slope in the opposite direction.

The Taptee has a total length of 441 miles, and is navigable by small vessels up to Surat, and by boats as far as its confluence with the Poorna, about 200 miles from the sea. It rises in the Sautpoora mountains, and divides that range from the Northern Ghauts. Its basin separates those of the Godavery and Nerbudda.

The Nerbudda is 801 miles in length. It is navigable by heavy boats for 85 miles from the sea, but only at intervals higher up, in consequence of falls and rapids. Sea-going ships ascend to Broach, 30 miles from the coast. The tide is felt 55 miles inland, and so far the river exceeds a mile in width. It rises in the Sautpoora mountains, and flows through a narrow and deep valley between them and the Vindhya mountains. This remarkable depression extends from the Gulf of Cambay on the west coast to the plains of the Ganges, being

watered by the Nerbudda westward, and the Sone, an affluent of the Ganges, eastward.

The Nerbudda basin is bounded by those of the Ganges, the Mahanuddy, the Godavery, and the Taptee.

#### VIII. 2.—ii. The Minor Basins of the Gulf of Cambay.

The Dhadur lies north of the Nerbudda. It forms a considerable estuary on which the bunder or port of Tuncaria is situated, and receives the streams descending from the western extremity of the Vindhya mountains.

The Mhye drains the south-western slope of the Salamber ranges, which confine the plateau of Malwa in that quarter, and connect the Aravulli mountains with the Vindhya mountains.

The Saburmuttee descends from the southern extremity of the Aravulli range, and has a course of 200 miles. These basins belong to the mainland of Guzerat.

#### VIII. 2.—iii. The Kattywar Basins.

The peninsula of Kattywar, in the territory of Guzerat, lies between the Gulf of Cambay and the Gulf of Cutch. The northern limit of the peninsula is partly formed by the latter gulf, and partly by the Little Runn, one of those remarkable flats for which this region is noted. A low isthmus between the Little Runn and the Gulf of Cambay unites Kattywar to the mainland. The *Null* is a noted depression in the isthmus. The Runn is flooded in the wet season, but in the dry months it is covered with a saline crust, with patches of clay and sand, totally devoid of vegetation. In the Runns, the mirage displays its atmospherical delusions to perfection.

A highland occupies the interior of the peninsula, from the midst of which the principal rivers flow eastward or westward. The streams which descend to the northern and southernmost shores rise on the outer slopes, and have shorter courses. The principal stream on the western side is the Bhadur, and on the eastern it is the Shetroonjee.

The highlands of Kattywar are remarkable for isolated masses, sometimes crystalline, among which is the Geernar mountain, rising to 3,500 feet almost perpendicularly. It occupies the middle of a circular basin, into which admission is gained by four passes at the cardinal points of the compass. The Palitana mountain is another of these masses, 1,500 feet in height, and capped by Jain temples of the most costly architecture.

#### VIII. 2.—iv. The Basins of Cutch and the Runns.

The island of Cutch is separated by the Little Runn and the Gulf from Kattywar, and by the Great Runn from Sindh. It is about 170 miles in length and 40 in breadth. A double range of mountains extends through the island, with conical peaks which invite examination, for the results of volcanic action have been observed at the base of the hills, and a severe earthquake which occurred in 1819 raised the Allah bund or Mound of God on the opposite shores of Sindh.

The Runns of Cutch are the receptacles of all the waters descending from the westward counterslopes of the Ganges basin between Kattywar and the Indus. Having their sources only in the low range of the Aravulli mountains, they are

unable to maintain that resistance to the fierce heat of the northern tropic which the Ganges and Indus support from perpetual snow. Thus, although the Western Bunass, which washes the cantonment of Deesa and empties itself into the Little Runn, has a course of 180 miles in length, and the Loonee, with many feeders descending from the Aravulli range, is 320 miles long; still both of them are probably dried up under the intense action of the vertical sun at the northern solstice. Partly from the same cause a considerable area between the Loonee and the Indus is devoid of rivers. The periodical rainfall in some places is caught in sars or artificial lakes of salt water, one of which, the Kanod Sar, in Jessulmere, is perennial, 18 miles long when full, and sometimes overflowing into a channel which it feeds for 30 miles further. But the principal water supply of the inhabitants of this region, who are numbered by thousands, is derived from their tanks of rain-water and wells, the latter being sunk in some parts to a depth of 300 feet.

#### IX.—THE INDUS BASIN.

The waterparting of the Indus commences on the west with the Cape Monze, or more properly between Kurrachee and the Gizree, or most westerly mouth of the delta by which the Indus falls into the Arabian Sea. But the separation of Kurrachee from the western arm of the delta is so slight, that it seems desirable to include the great seaport of the Indus within the limits of its basin.

From Cape Monze the waterparting is formed by the Hala range, dividing the Indus from the Hubb river, and proceeding somewhat west of north it separates the Beila or Poorallee river from streams which descend towards the Indus by the Gundava and Bolan passes. Thus the waterparting approaches close to Kelat, the capital of Beloochistan, and to Quetta on its northern frontier. From thence it is traced in an easterly and then northerly direction through Afghanistan, dividing the heads of numerous watercourses which descend to the Indus through the gorges of the Suleiman mountains, from others which belong to the basin of Lake Seistan. In approaching the Suffaid Koh mountains the waterparting divides the sources which flow towards Indus through the Gummul pass and the affluents of the Koorum river, from the small inland basin of Lake Ab-istada, around which it turns westward to enclose the affluents of the Cabul river. Proceeding northerly along the Pugman mountains, it separates the Cabul river from the Helmund, and thus reaches the summits of the Hindoo Koosh, where the Pugman range is connected with it by the Gorbund pass.

The lofty range of the Hindoo Koosh forms the next link of the waterparting, and divides the affluents of the Oxus from those conveyed to the Indus at Attock by the Cabul river. The proper limits of the Hindoo Koosh are indeed well defined by the drainage of the latter. Thus the Gorbund pass marks the division of Hindoo Koosh from the Koh-i-Baba range, and the Kara-Chunkar pass over the Tagh Dumbash, at the top of the Kooner or Chitral valley, equally separates it from the Karakoram mountains. The Kooner is the principal tributary of the Cabul river, joining it below Jellalabad, after a south-westerly course of 250 miles.

The Karakoram mountains part the Indus basin from that of Lake Lob. Recent explorations by the Changchenmo route from Lahore to Yarkand enable

the geographer to define the eastern limits of this range, as the pass which connects the head of the Karakash valley explored by Mr. Hayward with the Shyok valley. This pass is proposed to be called the Karakash, after the river of that name.

In claiming the valley in question for the Karakash, Mr. Hayward differs from the Survey map, which treats it as a branch of the Yarkand river. In either case it belongs to the Lake Lob basin, and the distinction therefore does not affect the present purpose.

In limiting the Karakoram mountains at the proposed point, it will be observed that so far they are the culminating ridge of a northern slope which finds its base in the Tarim river, which averages probably about 3,500 feet above the ocean level. The counterslope is of course the upper valley of the Indus.

If the range is considered to extend further eastward, then its northern slope falls upon the highly elevated plateau which drains into the Tibetan system of lagoons and lakes. The *base* of the northern slope is then found to be 17,000 feet above the sea, and on a plateau bounded further north by another range of mountains, which rises to altitudes of nearly 22,000 feet and probably more, before descending northwards to the valley of the Tarim. The latter range is the Kuenlun, which finds its western extremity on the right bank of the Yarkand river, the left bank of the river being formed by the spurs of the Karakoram and Pamir. The preceding range dividing the Indus from the basins of the Tibetan lakes, and commencing with the Karakash pass, should, it is thought, be considered a part of the great system of mountains which surrounds the elevated Tibetan basin towards the south, and forms the waterparting between it and the basins of the Indus and Bramaputra. Its northern base is throughout upon the great plateau which it supports and limits, while its southern base rests upon the upper courses of the Indus and Bramaputra or Sanpu. That part which rises from the left bank of the Sanpu, has long been known to geographers as the Gang-dis-ri mountains. The western part has recently been explored by one of the Indian pundits instructed by Major Montgomerie, and that surveyor has reported the name of one of the highest peaks to be Aling-Gang-ri ( $81^{\circ}$  east of Greenwich). The name established on the Sanpu portion of the range is thus found scarcely altered on the Indus part; and the western limit now assigned to the whole range in the Karakash pass corresponds exactly with the coincidence of the range and the Tibetan plateau. It is thus concluded that the pass at the head of Mr. Hayward's Karakash valley divides the Karakoram from the Gang-dis-ri mountains.

The waterparting of the Indus reaches the probable source of the main stream in the sacred peak of *Kailas* Parbat, called also by the pundit "Gang-ri;" and continues along the Gang-dis-ri mountains, which now skirt the Sutlej as far as the sacred lakes of Rakas Tal and Manasarowar, where the Sutlej rises. Here the basins of the Indus and Bramaputra barely meet, and the waterparting descending from the Gang-dis-ri mountains, crosses the continuous trough in which the great rivers have their rise, to flow away in opposite directions.

After crossing the valley, the waterparting ascends the innermost range of the Himalaya mountains, which here divides the Sutlej from the head-waters of the

Ganges. Following the course of the Sutlej, the waterparting crosses with that river the Himalaya plateau, and reaches the line of peaks which forms the outer range of the Himalaya mountains. Here it divides the Sutlej from the Jumna, which, unlike the Ganges, rises on the southern face of the outer range. Still following the left bank of the Sutlej and throwing off spurs and feeders to that stream on the one hand and to the Giri branch of the Jumna on the other, the waterparting descends from the Himalaya to the Sewalik hills, which divide the proper base of the Himalaya from the great plain. It turns easterly along the low Sewalik range, following a course parallel to the Giri river, and dividing the affluents of that river from the sources of the numerous streams which rise chiefly in the Sewalik hills between the Sutlej and Jumna.

It leaves the Giri, and turning southward between the sources of the Markanda nullah and Batta river, then bends to the west and south, following the Markanda, and dividing it from the sources of the Yar Buddree and Somb nullahs, until it reaches the great plain, at the Khadir bank west of the Jumna. The Khadir banks mark the limits within which the Jumna has changed its bed.

According to the Indian Atlas, sheet 48, the Yar Buddree nullah throws off the Soorsuttee to feed the Chittung, besides uniting itself with the Somb, which joins the Boodhee Jumna, where the Western Jumna Canal commences. Canals do their best to confuse waterpartings. Nature herself sometimes acts in the same way when a river naturally bifurcates, and the divided streams find different outlets. But in the present case it is not very difficult to draw the waterparting amidst the canalised streams that irrigate the plains, which here scarcely display their actual slope towards the Indus on the west and the Ganges on the east.

From the hills to Kurnal, the Khadir marks the waterparting very distinctly. South of Kurnal the waterparting is crossed by the Feroze Canal, which supplies the Chittung with the water of the Jumna. But even with this aid the Chittung is unable to reach the Indus, to which its channel naturally trends. Indeed all of the streams rising in the Sewalik hills between the Jumna and the Sutlej are unable to resist the absorbing influence of the heated plains. A partial diversion of the snow-fed Sutlej, together with the plantation and protection of trees, would probably be a practical remedy for this want.

About 29° north latitude the waterparting appears to cross the desert until it nearly reaches the Indus itself, where the Punjab proper terminates in the southernmost confluence of the five streams. Too little however is at present known of the desert tract between the Aravulli mountains and the Indus to form an idea of its natural slopes and watercourses, beyond some observations which indicate an elevation sloping in an uncertain way northwards to the Chittung and Ghughur, eastward to the Loonee, westward to the Indus, and southward to the Great Runn. This want of information will, it is hoped, be removed by the Surveys about to be published. In the meantime the waterparting can only be guessed; and on this indifferent basis it is assumed to follow the lower course of the river, eastward of a remarkable channel thrown off from the main stream and called the eastern Narra, till it terminates in the Great Runn.

Here ends this brief description of the Mountains and River Basins of India.

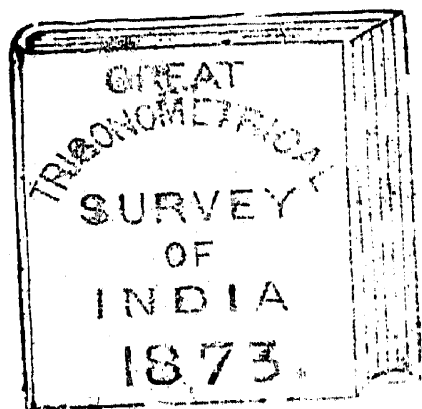
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The RIVERS OF INDIA; the AREAS of their BASINS and the LENGTHS  
of the MAIN STREAMS.

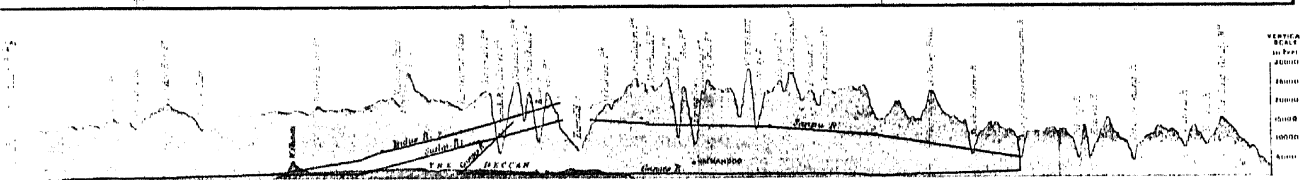
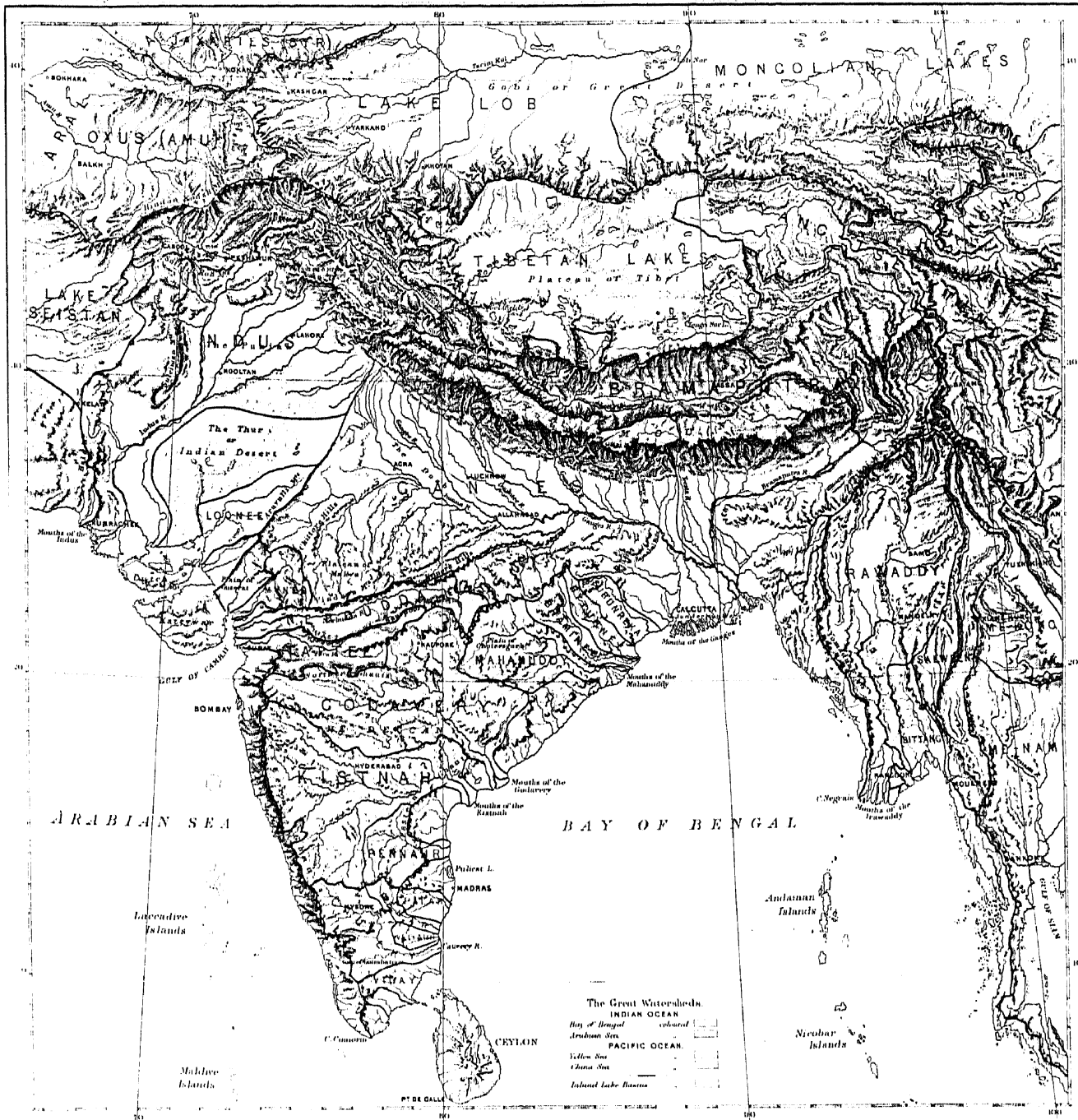
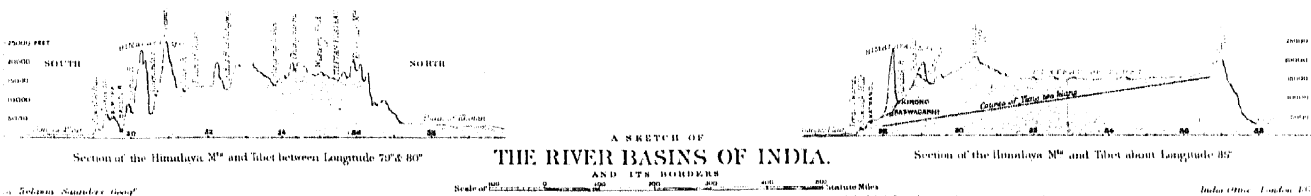
	Area in English Square Miles.	Length in English Statute Miles.
Ganges - - - -	391,100	1,514
*Indus - - - -	372,700	1,800
Bramaputra - - - -	361,200	1,800
Irawaddy - - - -	150,800	1,060
Godavery - - - -	112,200	898
Kistna - - - -	94,500	800
*Thurr Desert - - - -	68,700	—
Salween - - - -	62,700	750
Mahanuddy - - - -	43,800	520
*Western Ghauts, West Coast Basins -	41,700	—
*Nerbudda - - - -	36,400	801
Aracan Basins - - - -	29,700	—
Cauvery - - - -	27,700	472
*Kattywar and Cutch Peninsulas -	27,600	—
*Taptee - - - -	27,000	441
*Loonee - - - -	22,400	320
Orissa Coast Basins - - - -	22,200	—
Pennaur - - - -	20,500	355
Sittang - - - -	18,300	230
*Myhee - - - -	15,500	350
Braminee - - - -	15,400	410
Tenasserim Coast Basins - - - -	14,200	—
Byturnee - - - -	11,900	345
Subunrika - - - -	11,300	317
Gundlagunga, &c., Coromandel Coast -	10,300	—
Vigay - - - -	9,800	130
*Sabermuttee - - - -	9,500	200
Pulicat L., &c. - - - -	6,700	—
Palar - - - -	6,300	220
*Western Bunass - - - -	6,300	180
Penar - - - -	6,200	245
Vellaur - - - -	4,500	—
Vypar - - - -	3,900	—
Tamberpurny - - - -	3,600	80
L. Colair, &c. - - - -	3,100	—
*Dhadur - - - -	1,800	—
Total Area of the Indian Basins -	2,071,500	
.Basins of the Bay of Bengal -	1,441,900	
*Indian Basins of the Arabian Sea -	629,600	





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